AMENDMENTS TO THE DRAWINGS:

Please amend the drawing figures with the attached replacement drawing sheets.

In the amended drawing sheets some reference numbers (17A, 17B; 36A, 36B) have been amended in Figures 1, 3, 4, 9, 10 to conform the same to the reference numbers in respect to the numbers of the processing lines 10A and 10B.

REMARKS

The Examiner is thanked for the due consideration given the application. Substitute drawing figures have been provided that better set forth reference numbers.

Upon entry of this amendment, claims 1-12 and 15-20 are pending in the application. Claims 1-6 and 18 have been withdrawn from consideration. Claims 13 and 21 are canceled by this amendment. Claim 7 has been amended to improve the language, and the amendments to claim 7 find support in, e.g., Figure 6.

No new matter is believed to be added to the application by this amendment.

Entry of this amendment under 37 CFR §1.116 because it cancels claims and places the application in condition for allowance.

Election Restriction

Claims 1-6 and 18 have been withdrawn from consideration.

At paragraph 2 the Office Action again rejects the traversal to the election/restriction made in the previous Office Action, asserting that the grounds for rejoinder are not considered persuasive. The Office Action also asserts that a restriction requirement is a discretionary choice, and is governed by national U.S. patent code.

However, "discretionary" does not mean any power to reasonless reject the traversal without explicitly specifying which National rules are governing such a rejection.

Specifically, page 2 of the first Office Action refers to PCT Rules 13.1 and 13.2 objecting the claims of Group I and Group II because, according to PCT Rules, they lack the same or corresponding special technical features.

However, the International PCT Authority has never objected any lack of unity or single inventive concept for both groups of claims as originally filed.

Furthermore, the pneumatic clamping and vacuum holding device of the present invention are erroneously compared with the cited prior art.

Reconsideration and rejoinder is accordingly respectfully requested.

Art Rejection

Claims 7-13, 15-17 and 19-21 have been rejected under 35 USC §103(a) as being unpatentable over VORENKAMP et al. (WO 02/14050) in view of FEINSTEIN (U.S. Patent 2,796,033), DRESEN et al. (U.S. Patent 5,975,879), GORDON et al. (U.S. Patent 5,256,365), ALESI (U.S. Patent 3,779,697) and REIL et al. (U.S. Patent 5,158,786).

This rejection is respectfully traversed.

The present invention pertains to twin-sheet thermoforming of fuel tanks. The present invention is

illustrated, by way of example, in Figure 1 of the application, which is reproduced below.

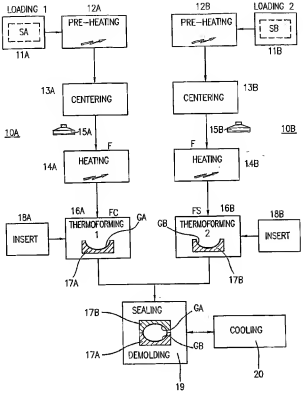


Fig. 1

In the present invention first and second sheets (SA, SB) of thermoformable plastic material, are separately fed along respective processing lines (10A, 10B). The sheets (SA, SB) are heated and gripped along their peripheral edges by a pneumatically actuate suction and vacuum sheet holding device (15A, 15B), for supporting the heated sheets (SA, SB) in a substantially flat condition while they are moved towards a respective thermoforming station (16A, 16B). Both the molds (17A, 17B) are disposed side by side with their open cavity facing upwards. After thermoforming of the plastic sheets (SA, SB), one

of the molds (17B) is turned upside down onto the other mold (17A), to overlap and weld superimposed sealing areas of the two thermoformed shells (GA, GB).

Another exemplary view of the present invention is shown in Figure 2C, which is reproduced below.

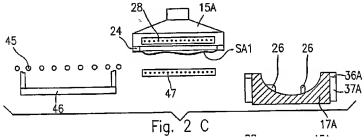


Fig. 2 C

This aspect of the present invention is reflected in the gripper (24A, 24B) and the vacuum sheet holding device (15A, 15B) set forth in independent claim 7.

As has been previously noted, in the present invention, a relevant difference exists between the "pneumatic gripping" and the "vacuum holding" of the plastic sheet.

VORENKAMP et al. pertain to producing plastic containers from thermoplastic sheets. Figure 1 of VORENKAMP et al. is reproduced below.

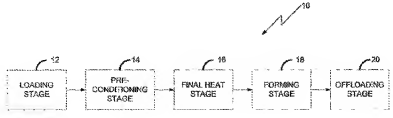


FIG. 1

The mold shells of VORENKAMP et al. are shown in Figure 3 of the reference, a portion of which is reproduced below.

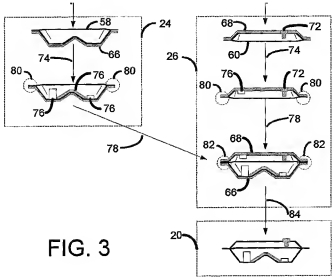


FIG. 3

Nevertheless VORENKAMP et al. do not disclose:

i) neither the use of side by side arranged first and second top open molds;

ii) nor the use of a device for:

a) pneumatically clamping the sheet at the upper side edges; and

b) vacuum holding the sheet moving the same in a flat and horizontal condition along both processing lines.

Furthermore VORENKAMP et al. do not teach:

c) to clamp the plastic sheet on the upper edge by a first movable pneumatic clamping device, and the pneumatic clamping of the same sheet, at the bottom edge, by a second clamping device movably supported by the mold, in a facing condition with the first clamping device.

The technical result of the deficiencies of VORENKAMP et al. is as follows:

The twin sheet parallel processing system of VORENKAMP et al. is directed to obtain high volume production of fuel tanks (page 3 - line 8 from the bottom), reduction in the processing time and reduction in energy consumption (page 4 - second paragraph); see also page 6 at the bottom, and page 11.

Apart from the use of top and bottom operators (page 13) and the use of assist and insertion mechanisms (page 14), VORENKAMP et al. merely specify that the plastic sheets are fed and "shuttled" along processing lines by "a clamp transfer system, a pin chain transfer, or any other system" (page 16 lines 7-9).

At the bottom of page 16, VORENKAMP et al. specify also that upon heating the plastic sheets to the processing temperature, with the sheet in a ***"sagging state"*** as illustrated in Figure 3 (reproduced above), the sheet transfer system operates to move the ***sagging sheets*** towards the top and bottom forming stage 24 and 26. Therefore VORENKAMP et al. do not disclose, nor suggest or make obvious the use of a vacuum holding device to avoid sagging of the heated sheets. VORENKAMP et al. is going in an opposite direction, i.e., teaching away, from the present invention.

During experimental tests, BINDA (the present inventor) discovered that moving the heated plastic sheet in a sagging

condition along the processing line involves some risks of damaging the same sheets by hitting obstacles during the movement.

Furthermore, the sagging of heated plastic sheets involves a harmful localized pre-stretching of the large sized sheets, due to their own weight, negatively affecting the physical and mechanical properties of the sheets and the resulting molded tanks.

Therefore, the present invention aims to avoid the sagging of the plastic sheets during heating and movement along the processing lines, as well as to avoid any pre-stretching risk, to maintain stable conditions for the plastic sheets up to the molding step.

Avoiding sagging and pre-stretching conditions, before molding, in combination with molding the sheets in two side-by-side arranged molds both facing upwards, will result in fuel tanks each conformed by shells having the same physical and mechanical features, producing unexpectedly improved tanks.

As specified at the bottom of page 6 and page 7 of VORENKAMP et al., the fuel tanks are performed by layered sheets including high-density polyethylene (HDPE), that is a very costly plastic material.

As set forth in independent claim 7, and more properly depicted in Figures 2D and 2E of the present invention, the

pneumatic clamping device 24, provided on the vacuum device 15A, clamps the sheet SA1 along the edge, on the upper side of the sheet, while the pneumatic clamping device 36A of the mold 17A is facing the clamping device 24 and clamps the sheet SA1 at the bottom side and in correspondence to the same clamping areas of the peripheral edge of the sheet. The waste of costly plastic material, in comparison to a mechanical clamping, is therefore considerably reduced.

Now consider the propriety of combining VORENKAMP et al. with FEINSTEIN.

According to the Office Action, FEINSTEIN discloses shaping molds side by side arranged, with the open cavities facing upwards, in which one mold is upside down turned and superimposed to the other mold, for welding overlapped sealing areas of the thermoformed shells.

According to the Office Action it would be obvious to apply the teachings of FEINSTEIN to VORENKAMP et al., to eliminate the mold half with the cavity facing downward, and the alignment of both mold halves.

However, the technical problem and the teaching of FEINSTEIN completely differ from VORENKAMP et al.

As previously noted, the scope of VORENKAMP et al. is to improve the efficiency and reduce the energy consumption in the production of fuel tanks.

Therefore VORENKAMP et al. suggest to process groups of thermoplastic sheets, along separate and parallely arranged processing lines, in which the heating take place upstream the molding step, in side by side arranged molds, in which each mold is aligned to a respective processing line.

Conversely, FEINSTEIN is directed to the manufacture of chocolate figures sealed in a plastic container, in substitution of an usual wrapper. FEINSTEIN teaches the use of two linearly connected molds hinged each other, moving along a same processing line and in which one of the mold is hinged at (18) to a belt (17), to be conjointly moved along the same processing line. No side-by-side arrangement of the molds or parallel processing lines is disclosed in FEINSTEIN.

Furthermore, in FEINSTEIN the plastic sheets are merely positioned on both molds in an unheated condition and moved in the unheated condition toward a working station in which heating and vacuum forming take place with the plastic sheet resting on the same molds. The teachings of FEINSTEIN point to a different direction compared to VORENKAMP et al. Therefore, considering the different problems and the different solutions, no useful teaching may be derived from FEINSTEIN, to be applied to VORENKAMP et al.

Now consider the remaining applied art.

Before discussing DRESDEN and the remaining documents it is useful to clarify again the features and the operative mode of the claimed plant of the present invention.

- The plant comprises two parallely arranged processing lines, which develop on a same horizontal plane.

- Each processing line (such as line A) includes (Figures 2A-2H) (optionally a pre-heating station 12A) a centering station 13A for a correct positioning of a plastic sheet SA, a heating station 14A, and a thermoforming station 16A.

Each processing line also includes transfer means 15A for moving each plastic sheet in a suspended condition, from the centering station 13A to the heating station 14A and above a mold 17A into the thermoforming station 16A, while maintaining the heated sheet in a suspended and substantially flat condition, avoiding sagging.

As stated at page 10, lines 21-22 of the specification, picking up and moving each plastic sheet in a heated condition, constitutes one of the most critical steps of the entire thermoforming process.

Therefore, a sheet transfer device 15A has been adapted to be movable along the horizontal processing line from the centering station, to the heating station and above the mold in the thermoforming station, maintaining the plastic sheet supported in a heated and substantially flat condition, parallel

to the processing line, preventing the sagging of the heated sheet.

To this purpose the sheet transfer device 15A includes:

a) A vacuum box or bell element 21 defining a bottom open vacuum chamber 22, movable up and down in respect to the processing line, and along the same processing line.

b) The vacuum box 21 is provided with a pneumatic clamping device (24) having at least one air suction channel 25 (Figure 6) peripherally arranged around the edges of the box; the air suction channel is connectable to an air suction source 25', to clamp the sheet SA at the upper side along its peripheral edge, and to close the vacuum chamber 22 of the box, by tightly clamping the plastic sheet SA.

c) The vacuum box 21 is also connectable to a vacuum source 23' by vacuum control means for vacuum holding the heated sheet SA in a suspended, horizontal and substantially flat condition, during the movement of the transfer device 15A along the processing line.

These features clearly distinguish claim 7 of the present invention from the applied art.

Now consider DRESEN et al., which the Office Action asserts teach the use of a "***pneumatically*** actuable gripper, ***formed by an air suction frame***".

DRESEN et al. refer to a thermoforming apparatus of carousel type, having one single processing line, in which each

clamping frame 66 clamps the sheet from the bottom side to be positioned between upper mold member. DRESEN et al. specifically describe (column 3 lines 51-61) the use of: ***"air actuated clamps"*** or mechanical clamping systems.

However, "air actuated clamps" does not mean that the sheets are "pneumatically clamped tightly by suction of air". DRESEN et al. teach the use of a set of jaws actuated by pneumatic cylinders. This is implicitly supported by Figure 3 of DRESEN et al. (reproduced below) in which the edge of the sheet 45 are schematically shown as clamped between opposite sides bars 30.

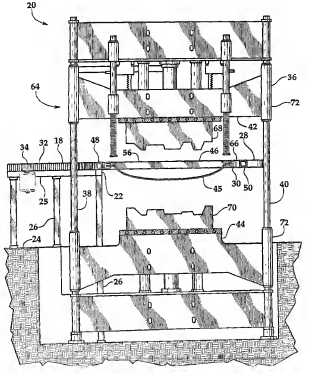
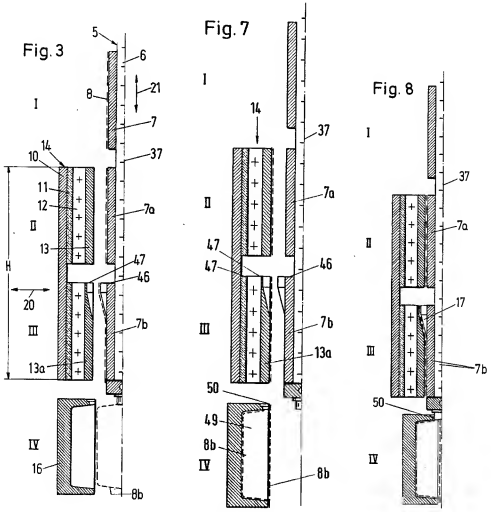


Fig.3

In any case, DRESEN et al. do not show, describe or teach the use of an "air suction frame."

Lastly DRESEN et al. do not teach the use of a pneumatic clamping device, for tightly clamping the sheet on the upper side, in combination with a vacuum holding or sheet suspending device, for maintaining the sheet in a flat condition.

The bowl drawer of REIL uses suction plates 7, 7a, 7b, such as is shown in Figures 3, 7 and 8, reproduced below.



REIL does not describe at all, how the plastic sheet 8 may be moved from the upper plate 7, to the central plate 7a and

to the bottom plate 7b, by the reciprocal movement of the heating and forward feeding jaw 5.

By comparing Figures 4 to 8 of REIL, one will see that the plastic sheets clamped by plates 7 and 7a, are alternatively clamped and released by the plates 7, 7a of the inside jaw 5 and the heating plates of the outside jaw 14, during the reciprocal movement of the same jaw 5.

The teachings of REIL thus completely differ, for scope and solution from the sheet transfer device 15A of the present invention:

a) which is conformed for pneumatically and sealingly clamping the peripheral edges of the sheet;

b) in which the heated sheet is hold by vacuum in a substantially flat and horizontal condition to avoid sagging;

c) in which sagging of the sheet is detected (see page 12 line 16); and

d) in which the vacuum is controlled (in relation to the detected sagging) to maintaining the heated sheet in a substantially flat condition.

Now consider GORDON, which the Office Action asserts teach the use of a vacuum holding device connectable to an ***adjustable*** vacuum source. According to the Office Action it would be obvious to apply the vacuum holding device and the adjustable vacuum source of GORDON to VORENKAMP et al.

However, GORDON relates to a transfer device for labels in a device for "blow molding" of bottles which, from a technical point of view, substantially differs from the vacuum or thermoforming technology. GORDON does not infer to "adjust" vacuum to maintain a required condition of the clamped label, during the transfer movement. GORDON merely suggests to "***change***" between "maximum vacuum" to allow a label to be picked up from the magazine, during a first travel, and a "reduced vacuum" during the remaining of the travel to allow the label to be "stripped" from the transfer cup, by the maximum vacuum existing in the suction cup of the labeling unit.

Again, the applicant does not see the same problem and the same solution, of the present invention.

In the Response to Arguments the Official Action asserts that a document, if not in the field of present application, in order to be relied upon as a basis for (obviousness) rejection of the claimed invention, may be considered as pertinent prior art if said document reasonably relates to the same particular problem.

This is not the case of GORDON compared to the present invention. In GORDON vacuum reduction (not the adjustment) is suggested to strip the label from the suction cup, and to allow the clamping of the same label by another suction cup. On the contrary, according to the present invention, the control and adjustment of the vacuum in the box or bell shaped vacuum chamber

of the plastic sheet transfer device, is required to avoid sagging of the sheet and to maintain the clamped sheet suspended on the peripheral edges in a flat condition.

Finally, consider ALESI. To this purpose, it is instructive to clarify that in the present invention, the air suction and vacuum are applied in three different points or combinations:

i) air suction is applied to sealingly clamp the sheet on the upper side, along the peripheral edges of the bottom open transfer box;

ii) vacuum is applied inside the transfer box to keep the heated sheet in a flat condition; and

iii) vacuum is applied in the mold for deep drawing of the plastic sheets.

The Office Action is improperly comparing "iii" relating to the thermoforming step of ALESI, with "ii" relating to the transfer step of the claimed invention.

Considering the different technical problems of the present invention and ALESI, the suggested combination merely results in providing the mold of VORENKAMP et al. with a vacuum chamber, but not the sheet transfer device of the same VORENKAMP et al. that, as previously clarified, is not of vacuum type.

Furthermore, ALESI does not teach the use of mold provided with a clamping frame; the clamping frame 28 in ALESI is a separate transfer device, as part of the entire machine, to

move the plastic sheet by a rotational movement, see figure 1 and 2, from the pre-heating station 32 to the heating station 34, and from the latter to the molding station, above the mold. No clamping frame and mold combination is described in ALESI.

Furthermore the problem solved by the clamping frame on the mold, in combination with the clamping frame of the sheet transfer device of the present, differs from the problem cited by the Office Action.

The clamping frame on the mold, in combination with the clamping frame of the sheet transfer device solve the main problem to reduce the scraps and loss of valuable material as stated at page 4, lines 13-16 of the specification. To this purpose in a plant according to the present invention, each mold is provided with a pneumatic clamping frame 36A (see Figure 2A, below) exactly conformed to face a corresponding pneumatic clamping frame 24 of the sheet transfer device 15A.

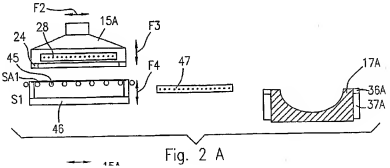


Fig. 2 A

The clamping frame at the mold is movable, by control cylinder upwards to clamp at the bottom side the edge of the

sheet SA1 retained at the upper side by the clamping frame of the transfer device, and downwards against the mold.

One of ordinary skill and creativity would thus fail to produce a claimed embodiment of the present invention from a knowledge of the applied art references. A *prima facie* case of unpatentability has thus not been made.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

Conclusion

The rejection is believed to have been overcome, obviated or rendered moot and no issues remain. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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APPENDIX:

The Appendix includes the following item(s):

☒ - Replacement Sheets for Figures 1, 3, 4, 9 and 10 of the drawings